TM 11-2559

WAR DEPARTMENT TECHNICAL MANUAL

FLUXMETERS TS-15/AP, TS-15A/AP AND TS-15B/AP

WAR DEPARTMENT • 27 DECEMBER 1944

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WASHINGTON 25, D. C., 27 December 1944.

TM 11–2559, Fluxmeters TS–15/AP, TS–15A/AP, and TS–15B/AP, is published for the information and guidance of all concerned.

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For explanation of symbols, see FM 21–6.

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LIST OF ILLUSTRATIONS

DESTRUCTION NOTICE

WHY — To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN — When ordered by your commander.

HOW — 1. Smash — Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut — Use axes, handaxes, machetes.
3. Burn — Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. Explosives — Use firearms, grenades, TNT.
5. Disposal — Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT — 1. Smash — Meters, knobs, switches, yokes, resistors, panel, and case.

2. Cut — Cable and wiring.
3. Burn — Technical manuals, schematic diagrams, cable, wiring, and wooden case.
4. Bend — All metal parts.
5. Bury or scatter — All of the above pieces after destroying their usefulness.

DESTROY EVERYTHING

WARNING

HIGH VOLTAGE

is used in the operation of
the radio equipment.

DEATH ON CONTACT

may result if personnel fail
to observe safety precautions.

Be careful to avoid contact with high-voltage circuits for 115-volt a-c input connections while checking or servicing the radio equipment. Make certain that the power is turned off before disassembling any part of the radio equipment.

Dangerously high voltages are present in the power supplies of the radio equipment. Before making any service checks, manually discharge all high-voltage capacitors in these circuits after the a-c power has been removed from the components.

FIRST AID TREATMENT FOR ELECTRIC SHOCK

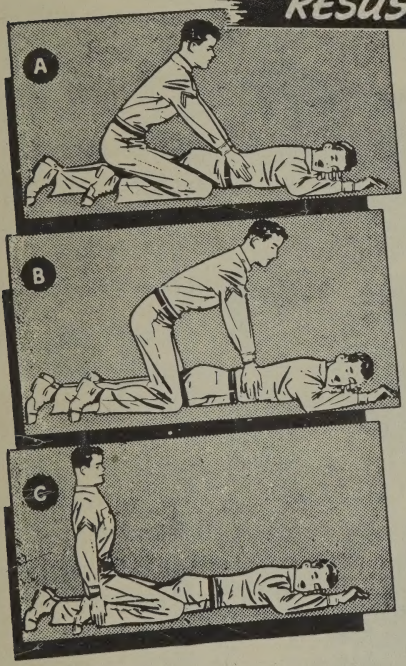
I. FREE THE VICTIM FROM THE CIRCUIT IMMEDIATELY.

Shut off the current. If this is not **immediately** possible, use a dry nonconductor (rubber gloves, rope, board) to move either the victim or the wire. Avoid contact with the victim. If necessary to cut a live wire, use an axe with a dry wooden handle. Beware of the resulting flash.

II. ATTEND INSTANTLY TO THE VICTIM'S BREATHING.

Begin resuscitation at once on the spot. Do not stop to loosen the victim's clothing. Every moment counts. Keep the patient warm. Wrap him in any covering available. Send for a doctor. Remove false teeth or other obstructions from the victim's mouth.

RESUSCITATION



POSITION

1. Lay the victim on his belly, one arm extended directly overhead, the other arm bent at the elbow, the face turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing (fig. A).

2. Straddle the patient's thighs, or one leg, with your knees placed far enough from his hip bones to allow you to assume the position shown in figure A.

3. Place your hands, with thumbs and fingers in a natural position, so that your palms are on the small of his back, and your little fingers just touch his lowest ribs (fig. A).

FIRST MOVEMENT

4. With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the victim. Your shoulders should be directly over the heels of your hands at the end of the forward swing (fig. B). Do not bend your elbows. The first movement should take about 2 seconds.

SECOND MOVEMENT

5. Now immediately swing backward, to remove the pressure completely (fig. C).

6. After 2 seconds, swing forward again. Repeat this pressure-and-release cycle 12 to 15 times a minute. A complete cycle should require 4 or 5 seconds.

CONTINUED TREATMENT

7. Continue treatment until breathing is restored or until there is no hope of the victim's recovery. Do not give up easily. Remember that at times the process must be kept up **for hours.**

8. During artificial respiration, have someone loosen the victim's clothing. Wrap the victim warmly; apply hot bricks, stones, etc. Do not give the victim liquids until he is fully conscious. If the victim must be moved, keep up treatment while he is being moved.

9. At the first sign of breathing, withhold artificial respiration. If natural breathing does not continue, immediately resume artificial respiration.

10. If operators must be changed, the relief operator kneels behind the person giving artificial respiration. The relief takes the operator's place as the original operator releases the pressure.

11. Do not allow the revived patient to sit or stand. Keep him quiet. Give hot coffee or tea, or other internal stimulants.

HOLD RESUSCITATION DRILLS REGULARLY

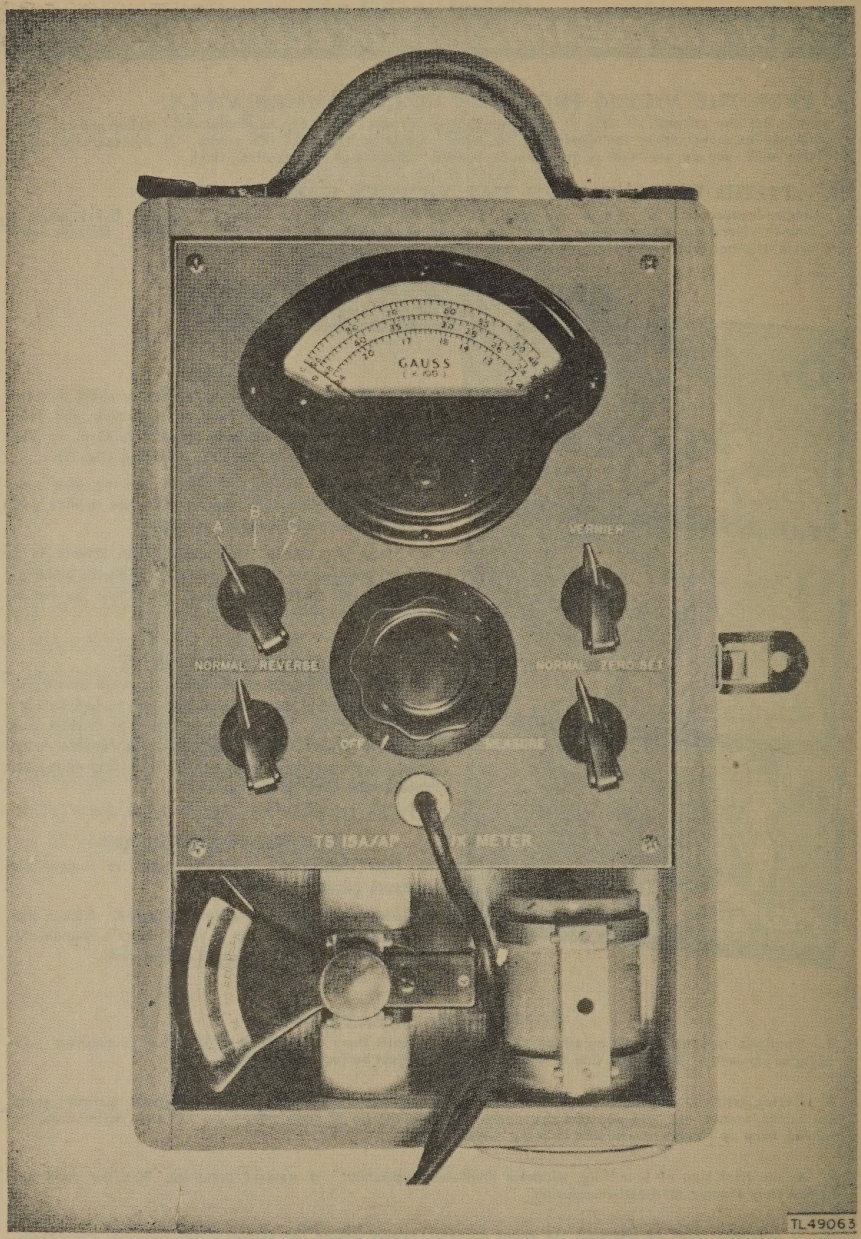


Figure 1. Fluxmeter TS–15A/AP.

SECTION I
DESCRIPTION

1. GENERAL.

a. The series of Fluxmeters TS–15/AP, TS–15A/AP, and TS–15B/AP is designed to provide qualitative measurements of the flux densities in magnets used in oscillatory circuits of X-band and S-band transmitters. Fundamentally, the three fluxmeters have the same basic features (fig. 1). Modifications have been made, however, in the models TS–15A/AP and TS–15B/AP to facilitate operation and insure greater accuracy of measurements. Each instrument is self-contained and mounted in a portable wooden cabinet 4½ inches deep, 6 inches wide, and 10 inches long; the complete set weighs 6½ pounds. A 1.5-volt battery mounted within the case supplies the power for each set.

b. Two meters are used in the operation of the instrument, a gauss meter and a probe meter. The gauss meter is mounted on the instrument panel and has three scales which give direct readings of flux densities in gausses. The probe meter is incorporated in a special probe head at the end of a length of cable which is connected internally to the instrument and brought out through the panel. When taking measurements of flux densities, the probe meter is inserted between the poles of the magnet under test and the indications are read on the gauss meter. Special mounting yokes are provided to hold the probe meter in place between the poles of magnets which have gaps extending from 0.6 inch to 2⅛ inches. For magnets with larger gaps a handle is provided with Fluxmeter TS–15B/AP to permit the probe meter to be held by hand between the magnet poles.

c. The various operating controls and switches are mounted on the panel of the instrument. A removable cover protects the instrument panel when the set is not in use. Storage space for the probe meter and cable is provided in one end of the wooden case.

d. Maintenance parts lists are not required for the fluxmeters. The instruments are stock-numbered as follows:

652489 O - 45 - 2

Fluxmeter	*Stock No.*
TS–15/AP	3F4325–15
TS–15A/AP	3F4325–15A
TS–15B/AP	3F4325–15B

2. CHARACTERISTICS.

The characteristics of each of the three fluxmeters are separately described below.

a. Fluxmeter TS–15/AP. This fluxmeter is designed to measure flux densities on three ranges from 1,200 to 4,500 gausses. The gauss meter has three scales marked A, B, and C. The A-scale covers a range of 1,200 to 2,300 gausses; the B-scale, a range of 1,700 to 3,200 gausses; and the C-scale, a range of 2,400 to 4,500 gausses. The panel equipment consists of the triple-range gauss meter, a three-position range switch labeled A, B, and C, a special two-position switch marked NORMAL and ZERO SET, a toggle switch marked DIRECT and REVERSE, and an OFF-MEASURE control that incorporates a switch to turn the instrument on and off. One yoke is provided for measurements on magnets with gaps from 1.3 to 1.5 inches and pole face diameters from 1.5 to 2 inches. The accuracy of the instrument is ± 2 percent between limits of 1,200 to 1,700 gausses on the A-scale, 1,700 to 2,400 gausses on the B-scale, and 2,400 to 3,300 gausses on the C-scale.

b. Fluxmeter TS–15A/AP (fig. 1). This instrument measures flux densities on three ranges from 1,200 to 9,600 gausses. The measurements are read on three meter scales marked A, B, and C. The A-scale covers a range of 1,200 to 2,400 gausses; the B-scale, a range of 2,400 to 4,800 gausses; and the C-scale, a range of 4,800 to 9,600 gausses. The meter readings are accurate within ± 2 percent. The panel equipment for this instrument consists of the triple-range gauss meter, a three-position range switch labeled A, B, and C, a two-position switch marked NORMAL and ZERO SET, a two-position switch marked NORMAL and REVERSE, an OFF-MEASURE control including the instrument on-off switch, and a VERNIER control for making finer adjustments of the meter pointers when using the OFF-MEASURE control. In addition to the yoke described in subparagraph **a** above and provided with this instrument, a smaller yoke is supplied for making measurements on magnets with gaps of 0.6 to 0.7 inch and pole face diameters of $\frac{7}{8}$ inch to $1\frac{1}{8}$ inches.

c. Fluxmeter TS–15B/AP. This instrument is essentially the same as Fluxmeter TS–15A/AP except for some additional modifica-

tions. The fluxmeter case has a recessed rubber gasket around the case opening to waterproof the instrument, and a metal carrying handle is provided in place of the leather handle on the carrying cases of the other models. Crossed hairlines are marked on the sides of the probe meter head to indicate the electrical center of the probe meter coil. In addition to the two yokes previously described, a metal handle is furnished for the probe meter. This handle is fastened to the probe head in the same manner as the yokes and is used when readings are to be taken on magnets with gaps too large for the use of the yokes. When the large yoke is used, provision must be made to keep the electrical center of the probe within the field of strongest magnetic flux. To accomplish this, a special adapter nut is supplied which is inserted between the yoke and the probe head.

Note: Fluxmeter TS–15B/AP is designed to be used with magnets having gaps too large for the use of the yokes. It is possible to use Fluxmeters TS–15/AP and TS–15A/AP with such magnets, however, provided that the intersection of the horizontal and vertical planes of the probe unit is positioned at the geometric center of the gap under measurement. The horizontal plane of the probe is indicated by the center of the knurled yoke attachment knob. The vertical plane is determined from the center of the circle formed by the springs on the yoke-bar when it is in position. In some uses, Fluxmeter TS–15/AP has been modified by the addition of crossed hairlines on the sides of the probe to facilitate determination of the geometric center of the vertical plane.

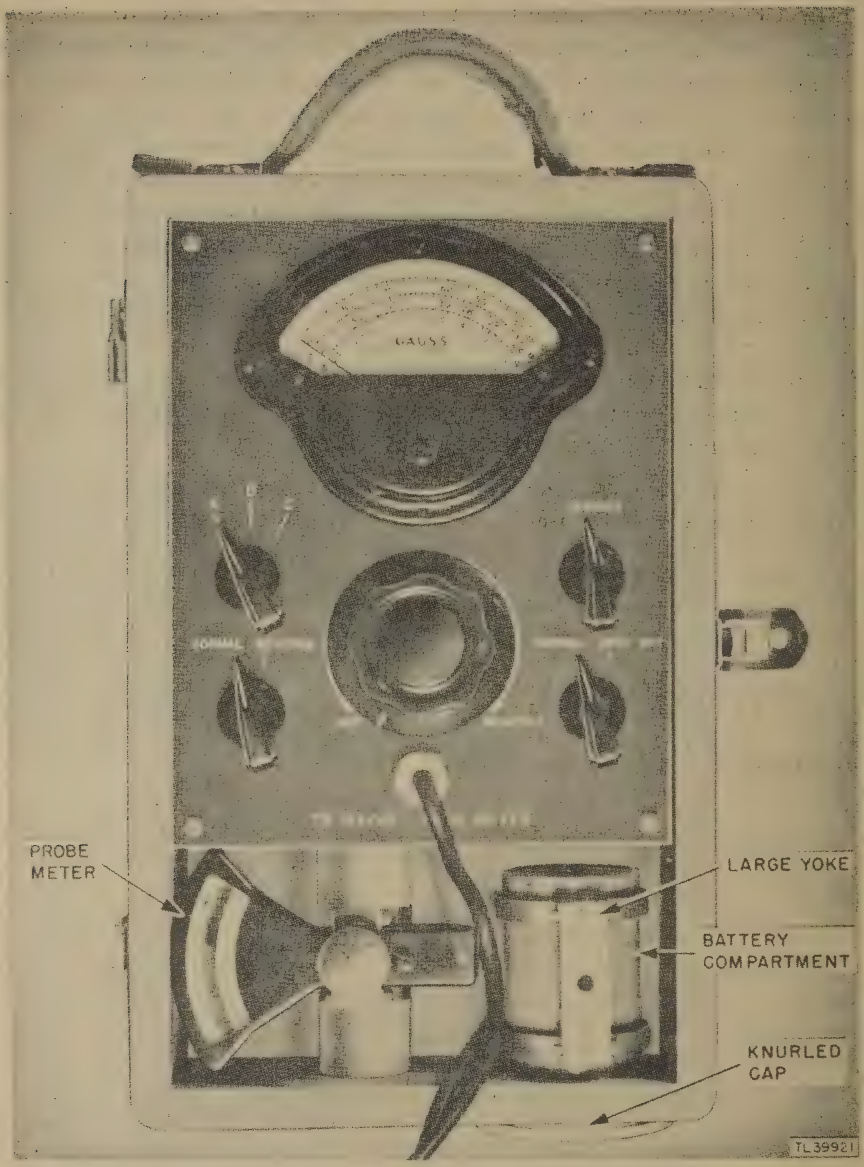


Figure 2. Fluxmeter TS–15A/AP, showing components and controls.

SECTION II

INSTALLATION AND OPERATION

3. PRELIMINARY INSTRUCTIONS.

Before making any measurements with the fluxmeter, the operator should become familiar with the controls and switches on the instrument panel (fig. 2).

a. OFF-MEASURE Control. (1) When measurements are being made with the fluxmeter, the meter indication is obtained by adjusting the OFF-MEASURE control. With the probe meter inserted between the poles of the magnet under test, the operation of this control adjusts the probe meter pointer to the red mark on the meter scale and simultaneously advances the pointer of the gauss meter. When the probe meter pointer has been adjusted to the red mark on its scale, the correct flux density can be read on the gauss meter, by using the proper scale as determined by the range selected and multiplying the reading by 100. This control is used also for the preliminary adjustment of the gauss meter. (2) A switch incorporated in the OFF-MEASURE control turns the instrument on and off. When the fluxmeter is not in use, the OFF-MEASURE control must be turned completely counterclockwise to the OFF position in order to prevent battery drain.

b. NORMAL-ZERO SET Switch. This switch is used in conjunction with the OFF-MEASURE control to make the preliminary adjustment of the gauss meter.

c. Range Selector Switch. The desired gauss meter range is selected by turning the three-position switch to the A, B, or C position. When the approximate value of flux density is unknown, always select the C-range first; then select the most suitable range for greatest accuracy of measurement.

d. NORMAL-REVERSE Switch. Because proper deflection of the gauss meter pointer is dependent upon the direction of the magnetic field in the magnet under test, the meter pointer may deflect backward when the probe meter is placed between the poles of the magnet. This condition can be corrected by turning the instrument off and setting the NORMAL-REVERSE switch to the

REVERSE position before continuing with the test. This switch is labeled DIRECT-REVERSE on Fluxmeter TS–15/AP.

e. VERNIER Control. This control is incorporated in Fluxmeters TS–15A/AP and TS–15B/AP. It provides a finer adjustment of the meter pointers than can be obtained with the OFF-MEASURE control, thereby insuring greater accuracy of measurement.

4. PREPARATION FOR USE.

Make the following adjustments on the gauss meter and the probe meter (fig. 3) before any measurements are made with the instrument.

a. Remove the probe unit from the storage recess and place it on a flat surface.

b. Align the probe meter pointer with the black mark on the meter scale by adjusting the zero-set screw. The probe meter pointer and its image in the mirror scale will coincide when the pointer is directly above the black mark. The zero-set screw is located beneath the knurled mounting bolt for the yoke and is easily accessible.

Caution: Never make the above adjustment of the probe meter pointer with the probe unit in a magnetic field.

c. Set the range selector switch to the C-position.

d. The NORMAL-ZERO SET switch must be in the NORMAL position.

e. Turn the instrument on by rotating the OFF-MEASURE control and continue turning this control in a clockwise direction until the gauss meter pointer is aligned with the mark at 48 on the C-scale. *See note below* (*subpar.* **i**).

f. Turn the NORMAL-ZERO SET switch and hold it to the ZERO SET position. The gauss meter pointer should now be aligned with the mark at 96 on the C-scale.

g. If the gauss meter pointer is not aligned with the mark at 96 on the C-scale, note the position of the pointer with respect to the mark at 96. Then turn the zero-adjusting screw on the front of the gauss meter to displace the pointer an equal amount on the opposite side of the 96 mark.

h. Release the NORMAL-ZERO SET switch and readjust the OFF-MEASURE control to return the meter pointer to the mark at 48 on the C-scale.

i. Repeat steps **f** and **g** above until the gauss meter pointer is

aligned with marks 48 and 96 on the C-scale for the two positions of the NORMAL-ZERO SET switch.

Note: The reference marks 48 and 96 indicated in subparagraphs e through i above refer to the two limiting marks on the C-scale of Fluxmeters TS–15A/AP and TS–15B/AP. Reference marks 48 and 96 correspond to marks 24 and 45, respectively, on the C-scale of Fluxmeter TS–15/AP. Accordingly, when making the above adjustments on Fluxmeter TS–15/AP, substitute the marks 24 and 45 on the C-scale for the reference marks 48 and 96 previously indicated. For maximum accuracy, these adjustments on the gauss meter should be made with the instrument at a temperature of 16°C (61°F) to 30°C (86°F).

Figure 3. Probe assembly.

5. OPERATION (fig. 4).

Complete instructions for making measurements of flux densities in magnets are detailed below.

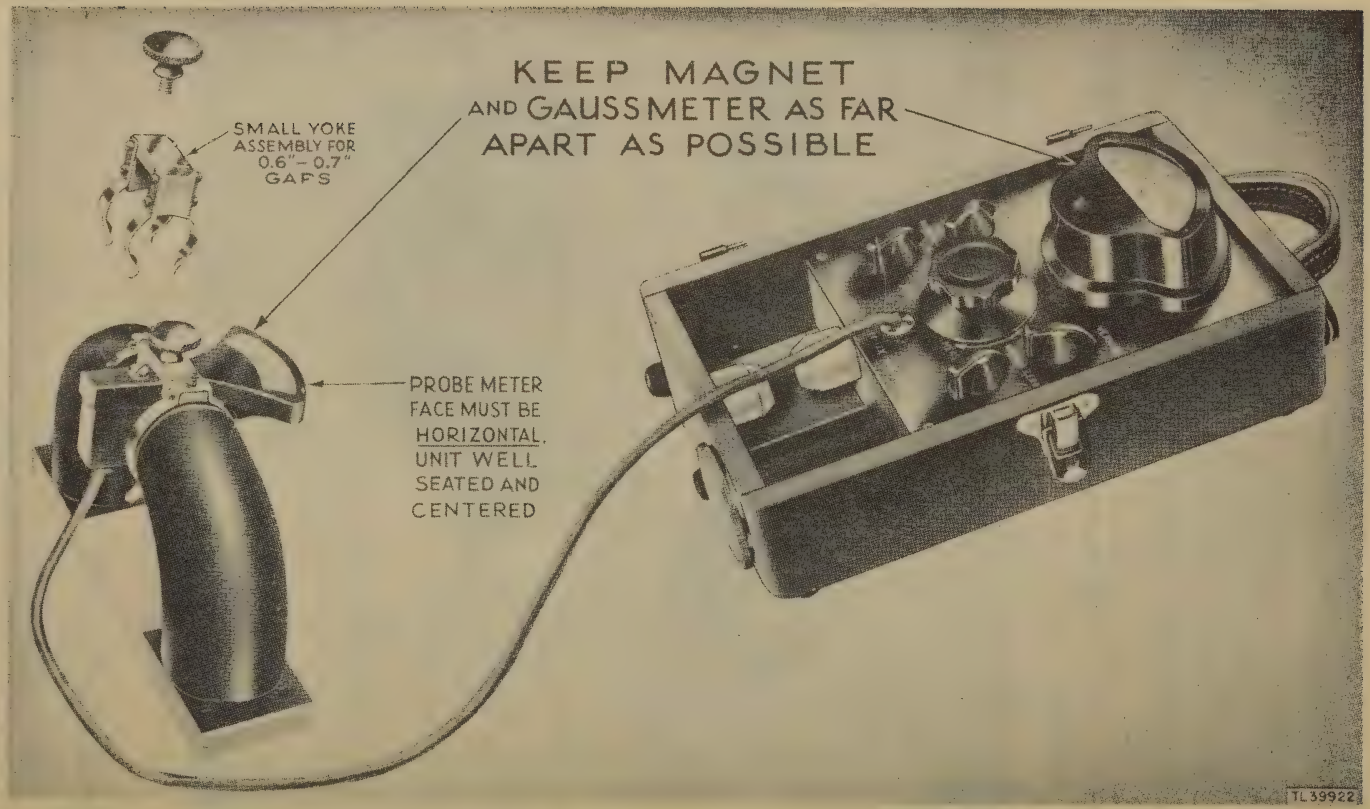


Figure 4. Fluxmeter in use.

a. Select the yoke to be used (or the handle) and attach it to the probe head with the nickel-plated mounting bolt.

b. With the OFF-MEASURE control in the OFF position, insert the probe unit between the pole faces of the magnet, making sure that the unit is well seated and centered. The face of the probe must be horizontal.

c. Place the fluxmeter cabinet as far from the magnet as the probe cable will permit.

Caution: The gauss meter in the cabinet is magnetically shielded, but close proximity to powerful magnets of the type with which this instrument is intended to be used will introduce serious errors in its readings. Continued exposure may result in permanent errors.

d. Set the range selector switch to the proper position. If the approximate value of the flux density is unknown, set the range selector switch to the C-position. Then determine and select the most suitable range for the greatest accuracy of measurement.

e. Set the NORMAL-REVERSE switch to the NORMAL position.

f. Turn the instrument on and rotate the OFF-MEASURE control slowly in the clockwise direction, at the same time watching the probe meter.

g. If the pointer of the probe meter deflects backward, turn the OFF-MEASURE control to the OFF position, set the NORMAL-REVERSE switch to the REVERSE position, and repeat the operation described in subparagraph **f** above.

h. Advance the OFF-MEASURE control until the pointer of the probe meter is aligned with the red mark on its scale, or until the gauss meter pointer reaches full-scale deflection. If the latter occurs, return the OFF-MEASURE control to the OFF position, set the range selector switch to the next lower range, and repeat the operation.

Note: Use the VERNIER control to obtain finer adjustment of the probe meter pointer when making measurements with fluxmeter models that possess this control.

i. With the probe meter pointer set accurately to the red mark on its scale, the flux density in gausses can be read directly on the gauss meter scale. Read the value of the flux density on the A-, B-, or C-scale, as determined by the setting of the range selector switch, and multiply the reading by 100.

j. After all measurements have been made, turn the OFF-

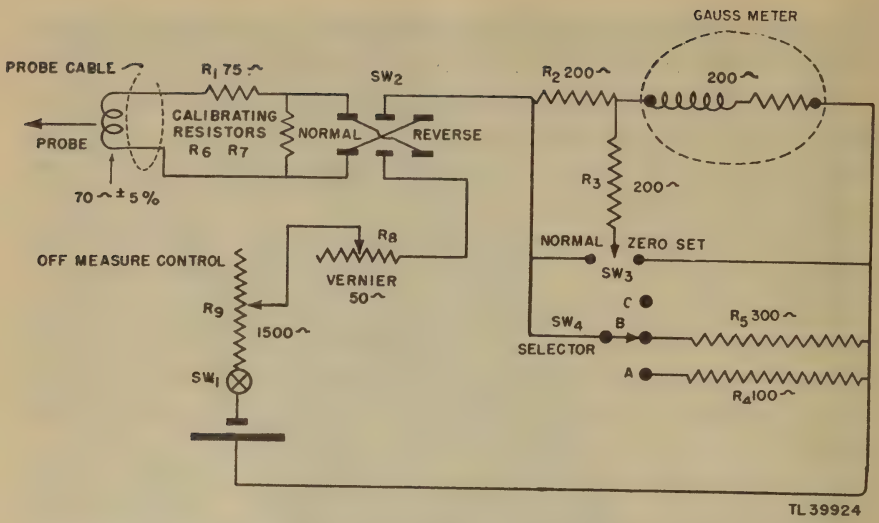


Figure 5. Fluxmeters TS–15A/AP and TS–15B/AP, schematic diagram.

MEASURE control fully counterclockwise until the switch snaps in the OFF position. Make certain that the instrument is turned off; otherwise, there will be a constant drain on the battery, which will soon destroy its usefulness. Remove the probe unit from the magnet and store the unit and the cable in the recess provided in the fluxmeter case. Replace the cover and return the instrument to its proper place.

SECTION III

FUNCTIONING OF PARTS

6. GENERAL.

a. Fluxmeters TS–15/AP, TS–15A/AP, and TS–15B/AP have essentially the same basic circuit (figs. 5 and 6). The fundamental features of this circuit consist of two milliammeters (probe meter and gauss meter) in series with a 1.5-volt battery and a rheostat to control the battery current. The gauss meter measures the current through the circuit and is accurately calibrated to give readings directly in gausses on three scales. Gausses are magnetic units of measurement indicating magnetic lines of force per square centimeter, one gauss representing one magnetic line of force per square centimeter. The probe meter has no internal magnet but is actuated by the magnetic flux in the gap of the magnet under test. The deflection of the probe meter pointer is constant for all measurements and is therefore dependent upon two properties: namely, the amount of current through the probe meter coil and the flux density in the magnet gap. These two properties determine the torque on the coil. This torque is kept a constant value by setting the probe meter to the red mark for each measurement. The current and flux density vary inversely to each other, the probe meter requiring less current through its coil in strong magnetic fields and more current through the coil in weak magnetic fields for the fixed amount of deflection.

b. Referring to the schematic diagram (fig. 5), note that the gauss meter on Fluxmeters TS–15A/AP or TS–15B/AP can be shunted by either one of two resistances of different values or the shunt removed by operating the range selector switch. When using the low range of the fluxmeter, set the selector switch to position A, which puts the lowest value of resistance in shunt with the gauss meter. This allows the maximum amount of current to pass through the probe meter coil, permitting full-scale deflection of the probe meter pointer with small values of flux density. When the selector switch is set to position B, a larger value of resistance shunts the gauss meter and a larger value of flux density can be

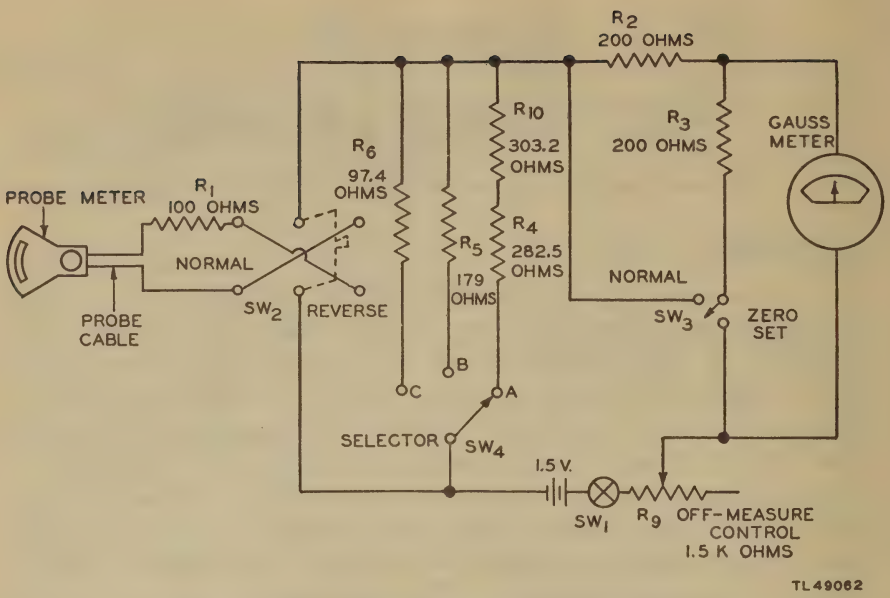


Figure 6. Fluxmeter TS–15/AP, schematic diagram.

measured. The maximum range is available when the selector switch is set to position C, which removes the shunt from across the gauss meter. With the selection of the larger value of shunt resistance and finally the removal of the shunt, the current through the probe meter is proportionately decreased and greater flux densities are required to give full-scale deflection of the probe meter pointer. In this manner the effective range of the fluxmeter is increased, permitting measurements over a wide range of flux densities. The meter scales are labeled A, B, and C to correspond with positions A, B, and C of the range selector switch. The circuit of Fluxmeter TS–15/AP functions the same as that described above, but the shunts are placed across the probe meter rather than across the gauss meter (fig. 6), and the resistances of the shunts decrease to increase the range.

c. A standard meter having a 1-milliampere movement would give a reading with the probe meter inserted in very weak magnetic fields. This would necessitate crowding a large number of divisions on the meter scale and thereby reducing the accuracy of the readings. To provide more accurate readings within the limits of the gauss meter scales, it is necessary to hold the pointer of the meter at zero deflection in the undesired lower range in order to spread out the scale divisions through the desired range. This

is done by providing the gauss meter with what is known as a suppressed or retarded zero. With no current through the gauss meter coil, the meter pointer is held off the scale on the left-hand side of the meter by spring tension. One milliampere of current must flow through the meter coil to bring the pointer to the first mark on the left side of the scale, and 2 milliamperes of current must flow through the coil to cause full-scale deflection of the meter pointer. Thus the scale divisions are spread out, permitting more accurate readings to be obtained. Readings for magnets with flux densities below a specific value (1,200 gausses) cannot be obtained on the gauss meter.

d. Resistors R2 and R3 on the schematic diagram are used in conjunction with the NORMAL-ZERO SET switch to calibrate the gauss meter. With this switch in the NORMAL position, the two resistors are in parallel and the full value of the available current flows through the gauss meter coil. When calibrating adjustments are made on the gauss meter as described in paragraph 4, the switch is set to the ZERO SET position. This action puts resistor R3 in shunt with the meter, and the amount of available current through the meter coil is reduced by one half. The NORMAL-ZERO SET switch is spring-operated and ordinarily remains in the NORMAL position. It is held in the ZERO SET position when making calibrating adjustments on the gauss meter.

e. When the probe meter is inserted in a magnet gap, the direction in which the probe meter pointer deflects depends upon the direction of the magnetic lines of force and the direction of the current flow through the probe meter coil. Since most magnets are not marked to indicate their magnetic polarity, the meter pointer may read backwards. To correct this condition, either the position of the probe unit must be reversed in the magnet gap or the direction of current flow through the meter coil must be reversed. Instead of reversing the position of the probe unit, a double-pole, double-throw switch is incorporated in the fluxmeter circuit to change instantly the direction of the current flow and thus cause the meter pointer to deflect in the proper direction over the scale. This switch is located in the lower left section of the fluxmeter panel and is marked NORMAL and REVERSE.

f. The OFF-MEASURE control (R9) regulates the amount of current through the fluxmeter circuit. It is used in making the meter calibrating adjustments and in the actual measurement of magnetic flux densities. The instrument on-off switch is incorporated in the OFF-MEASURE control and is operated by turn-

ing the control knob slightly clockwise. In order to obtain a finer adjustment of the meter pointers, a VERNIER control operating in conjunction with the OFF-MEASURE control is an added feature in Fluxmeters TS–15A/AP and TS–15B/AP. The resistor (R1) in series with the probe unit serves, when switching ranges, to reduce the temperature error caused by shunting the probe meter with different values of resistance.

SECTION IV

MAINTENANCE

Note: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report). If Form No. 468 is not available, see TM 38–250. Failure or unsatisfactory performance of equipment used by Army Air Forces will be reported on Army Air Forces Form No. 54 (Unsatisfactory Report).

7. GENERAL.

This series of fluxmeters requires accurately calibrated and matched components; therefore only minor repairs and replacements can be made in the field. When the fluxmeter develops a major defect, the entire unit must be replaced. Maintenance work on the instrument is restricted to routine inspection and battery replacement as described below.

a. Install a new battery (Battery BA–30) when full-scale deflection of the gauss meter pointer can no longer be obtained with the OFF-MEASURE control (and VERNIER) turned completely clockwise. For this test on the battery, the range selector switch is set to the A-position. If the readings are unsteady, clean the battery terminals.

(1) To replace the battery in Fluxmeter TS–15/AP, proceed as follows:

(*a*) Remove the four screws from the instrument panel.

(*b*) Raise the panel a few inches and remove the old battery.

(*c*) Insert a new battery between the mounting clips. *Observe polarity markings.* Be careful to avoid damaging any of the wiring.

(*d*) Replace the instrument panel and tighten the mounting screws.

(2) To replace the battery in Fluxmeters TS–15A/AP and TS–15B/AP, use the following procedure:

(*a*) Unscrew the knurled cap on the lower end of the instrument case (fig. 2).

(*b*) Remove the old battery and replace it with the new one.

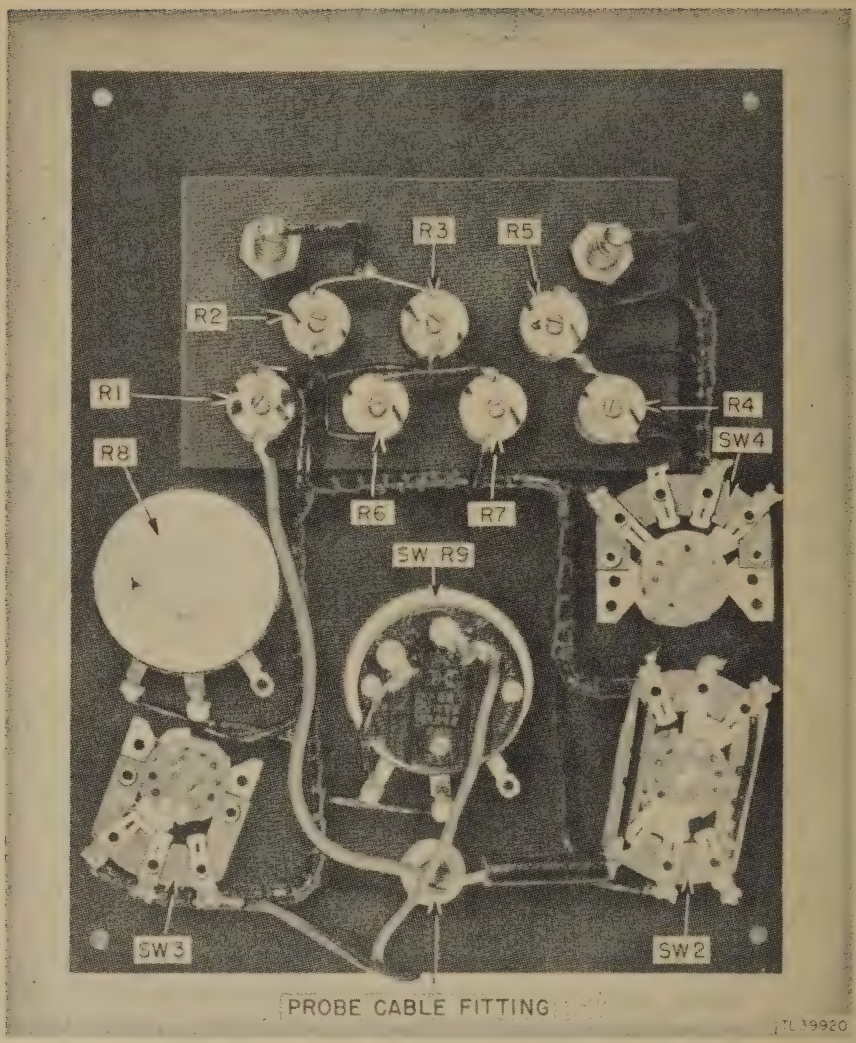


Figure 7. Fluxmeters TS–15A/AP and TS–15B/AP, bottom view of panel.

(*c*) Screw the knurled cap firmly into place.

b. If the fluxmeter fails to operate, make an inspection of all wiring and connections (fig. 7). An analyzer may be used to check continuity. Before using the analyzer, disconnect the gauss meter and the probe meter from the circuit. *Do not attempt to measure the resistance of the meters or they will be damaged.*

8. TROUBLE-SHOOTING CHART.

The following chart will serve as a guide if the instrument fails

to function properly. Only minor repairs can be made in the field without affecting the accuracy of the instrument; therefore, no part replacement should be attempted. If a part fails, the entire fluxmeter should be replaced.

Symptom	Possible fault	Correction
a. Instrument dead.	1. Dead battery. 2. Battery is not making contact in the case. 3. Switch 1, R8, or R9 open.	1. Replace the battery. 2. Clean the contacts. Make certain the cap is tightly seated.
b. Cannot zero set probe.	1. Current is on. 2. Probe is near a source of magnetic flux.	1. Turn the OFF-MEASURE knob to OFF. 2. Remove the probe from the magnetic field.
c. Probe deflects on all ranges, but gauss meter does not.	1. Dry cell is reversed in battery case. 2. Gauss meter is open or shorted.	1. Remove and reverse the dry cell.
d. The gauss meter does not return to zero when NORMAL-ZERO SET switch is in the ZERO position.	1. Poor connection on NORMAL-ZERO SET switch. 2. R3 open. 3. R2 shorted. 4. Defective gauss meter.	1. Clean and check the switch points.
e. The gauss meter returns to the extreme left position when NORMAL-ZERO SET switch is in ZERO SET position. Will not zero set.	1. R2 open. 2. R3 shorted. 3. Defective gauss meter.	
f. The probe meter does deflect. The gauss meter deflects on all ranges.	1. Poor connections on NORMAL-REVERSE switch. 2. Open or shorted probe cable. 3. Open or shorted probe coil.	1. Clean and check the contacts.
g. The probe pointer will not reach RED mark on any range.	1. Weak battery. 2. Magnet field strength below 1,200 gausses. 3. Obstruction inside probe.	1. Replace the battery. 3. Remove the cover of the probe by removing three Phillips screws on case. Check for foreign matter catching pointer or obstructing

Symptom	Possible fault	Correction
		the coil. The lead wire may be caught on the balance tail. Remove with tweezers or by careful blowing.
h. With the NORMAL-ZERO SET switch in the NORMAL position, full-scale deflection cannot be obtained on the gauss meter with the OFF-MEASURE control turned fully clockwise.	1. Weak battery.	1. Replace battery.
	2. Poor contacts on the NORMAL-ZERO SET switch.	2. Check the switch contacts.
	3. Poor contact of the sliding arm on the OFF-MEASURE control.	3. Check the sliding contact arm.
	4. Poor contact in the NORMAL-REVERSE switch.	4. Check the switch contacts.
	5. Loose or broken connections.	5. Check the circuit continuity.
i. The gauss meter is off calibration on range C.	1. Zero settings are improperly made.	1. See section II and rezero.
	2. The gauss meter is too close to a magnet.	2. Separate.
	3. The yoke is not securely attached to the probe.	3. Recheck.
	4. The probe is not properly seated in the magnet gap.	4. Reseat.
	5. R1, R6, or R7 is shorted, open, or has a high resistance connection or partial short.	
	6. Gauss meter is off calibration.	
j. The gauss meter is OK on range C but off on range B.	1. Defective connections on the selector switch.	1. Clean and check the contacts.
	2. R5 is defective.	
k. The gauss meter is OK on ranges B and C but off on range A.	1. Defective connections on the selector switch.	1. Clean and check.
	2. R4 or R10 defective.	
l. OFF-MEASURE or VERNIER controls are erratic and jumpy. It is difficult to set the probe pointer on the RED mark.	1. Dirty contact between the wiper arm and the resistance winding.	1. Clean and check.
	2. Broken winding on control R8 or R9.	

9. MOISTUREPROOFING AND FUNGIPROOFING.

a. General. The operation of Signal Corps equipment requires special attention in tropical areas where temperature and relative humidity are extremely high. Following are typical problems which may be encountered in operation:

(1) Resistors and meter coils fail.

(2) Hook-up wire and cable insulation breaks down. Fungus growth accelerates deterioration.

(3) Moisture forms electrical leakage paths between terminals and connections and causes defective operation.

b. Treatment. A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied with a spray gun or brush. Refer to TB Sig 13, Moistureproofing and Fungiproofing Signal Corps Equipment, for a detailed description of the varnish-spray method of moistureproofing and fungiproofing and the supplies and equipment required in this treatment.

Caution: Varnish spray may have toxic effects if inhaled. To avoid inhaling spray, use respirator if available; otherwise, fasten cheesecloth or other cloth material over the nose and mouth.

c. Step-by-step Instructions for Treating Fluxmeters TS–15/AP, TS–15A/AP, and TS–15B/AP.

(1) PREPARATION. Make all repairs and adjustments necessary for proper operation of the equipment.

(2) DISASSEMBLY.

(*a*) Remove the four mounting screws from the instrument panel.

(*b*) Raise the panel from case.

(*c*) Disconnect the leads from the battery terminals.

(*d*) Remove the instrument panel from the case.

(*e*) Remove the probe unit from the case.

(*f*) Unscrew the two screws from the battery clamp and remove the clamp and battery.

(*g*) Replace all screws in their original positions.

(*h*) Clean all dirt, dust, rust, fungus, oil, grease, etc., from the equipment to be processed.

(3) MASKING. No masking is necessary.

(4) DRYING. Dry the entire unit for six hours at 140°F.

(5) VARNISHING.

(*a*) Apply three coats of moistureproofing and fungiproofing varnish (Lacquer, Fungus-resistant, Spec No. 71-2202 (stock No. 6G1005.3), or equal).

(*b*) Brush-coat the entire assembly on the rear of the front panel.

Caution: Keep varnish off all moving contacts and rotating shafts.

(*c*) Brush-coat the battery leads.

(*d*) Brush-coat the gauss meter housing. Care must be taken to assure a complete seal around the glass face and around the outer edges of the meter housing on the panel.

(*e*) Brush-coat the inner and outer surfaces of the fluxmeter case.

Caution: Do not apply varnish to the snap lock or hinges.

(6) REASSEMBLY. Reassemble the set and test its operation.

(7) MARKING. Mark the set with "MFP" and the date of the treatment.

EXAMPLE: MFP—8 June 1944.

GPO 896728

5330-890-8662

T. 229

TM 11-2559-2 SIGNAL CORPS 12-19-56

PUBLICATION FLUXMETER: MODEL TS-15/AP, TS-15A/AP, TS-15B/AP, MAINTENANCE MANUAL DTD 27 DEC 44			CHARGE OUT RECORD CARD
DATE ISSUED	SIGNATURE OF RECIPIENT	DIVISION SECTION OR OFFICE	DATE RETURNED

EMC 330 (1 NOV 54)

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